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GB A 2128510
GB A 2100151
GB A 2088755
GB A 2086279
GB 1578555
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(54) A bone drill

(57) The drill comprises a tubular shank (10) having a handle (11) and a series of circumferentially-spaced, axially-extending saw teeth (12). A groove (13) between each consecutive pair of teeth (12) extends part way along the outer surface of the shank (10) and permits escape of bone dust from around the cutting edges of the teeth (12). Staggered apertures (14) permit some of the bone dust to escape inwards through the wall of the tubular shank (10).

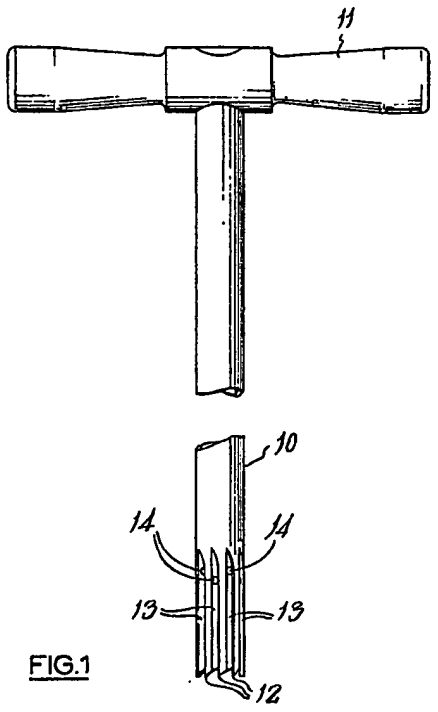

FIG.1

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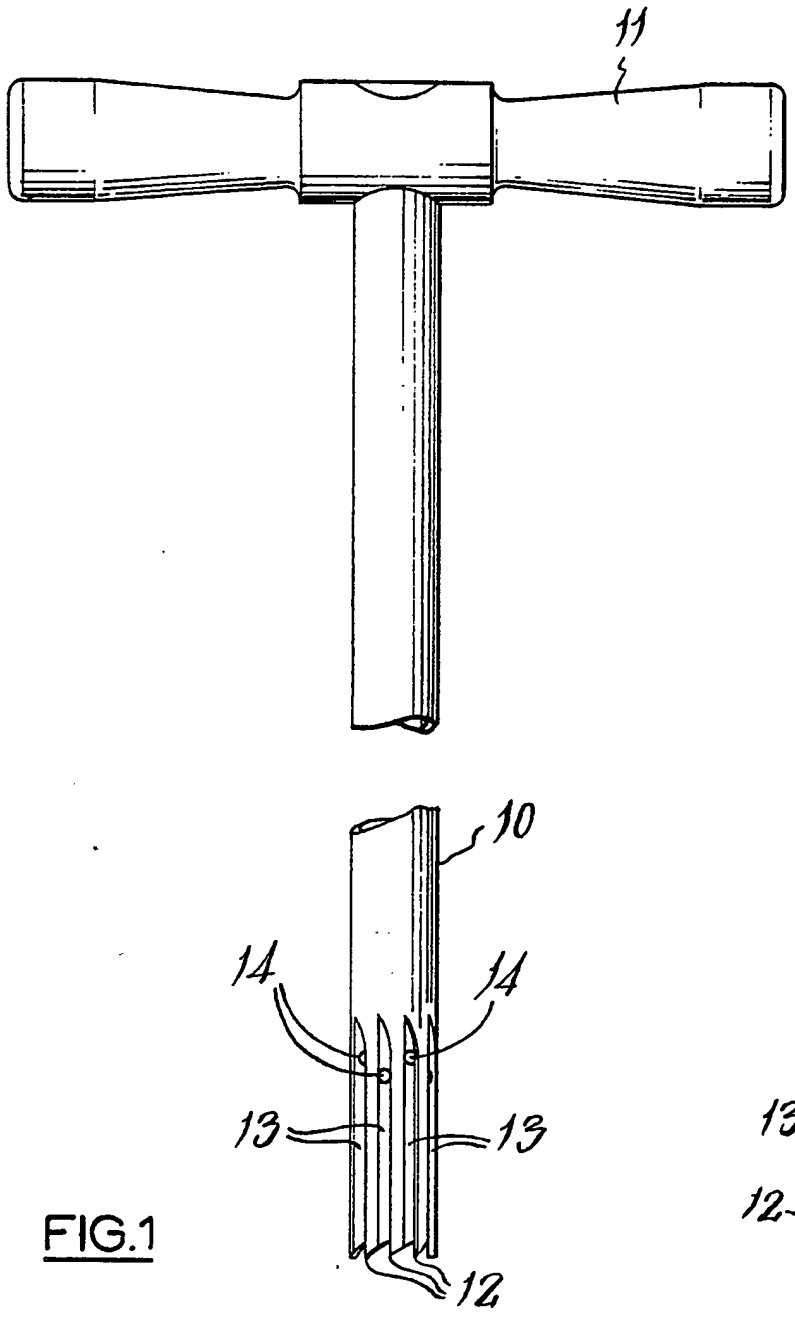

FIG.1

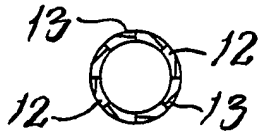

FIG.2

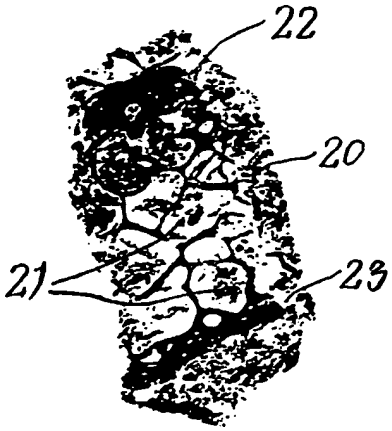

FIG.3a

FIG.3b

SPECIFICATION

A bone drill

This invention relates to a transilial bone drill for taking biopsy specimens and generally of the type developed by Bordier in 1964.

A drill of this kind comprises a tubular shank of circular cross-section, usually with a handle at one end and at the other a series of circumferentially-spaced, axially-extending saw teeth. The drill is used to extract a core-type sample of bone for biopsy purposes.

A disadvantage with this kind of instrument is that so-called bone dust, i.e. fine particles of bone material, formed by the action of the saw teeth on the bone, builds up between the teeth and impedes the advance of the drill through the bone, resulting in the need for increased pressure in order to effect penetration and frequent sharpening of the teeth. The extra pressure forces the bone dust into the biopsy specimen where it is deposited around the outer surface. In particularly difficult cases, the dust can penetrate to a considerable depth into the biopsy specimen. The affect of the dust upon the sample considerably reduces the area of cut sections which are suitable for histomorphometry, which in turn impairs the ability for the analyst to take accurate measurements of the different tissues within the section. Deterioration of the specimen in this way causes Trabeculae close to the surface of the specimen to become fractured, and in extreme cases there is also fracturing of the cortex, particularly the inner cortex.

An object of the present invention is to provide a bone drill the construction of which permits a biopsy specimen to be taken in which contamination by bone dust is greatly reduced and which permits easier operation and renders the operation less traumatic for the patient.

According to the present invention there is provided a bone drill comprising a tubular shank of circular cross-section having at one end a series of circumferentially-spaced, axially-extending saw teeth, and a groove between each consecutive pair of teeth extending part way along the outer surface of the shank to permit escape of bone dust from around the cutting edges of the teeth.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a view in elevation of a transilial bone drill made in accordance with the invention;

Figure 2 is an end view thereof, and

Figures 3a and *3b* are reproductions of photographs showing biopsy slices produced using respectively a conventional drill and a drill made in accordance with the invention.

Referring now to the drawings, the drill comprises a tubular shank 10 of circular cross-section having an operating handle 11 at one end, and at the other end a series of circumferentially-spaced, axially-extending saw teeth 12. Between each consecutive pair of teeth 12, there is a groove 13 extending along the outer surface of shank 10 part way along the latter to a position at which it tapers upwardly towards the surface. Close to the tapered end of each groove is an aperture 14 extending through the tube wall. The apertures 14 in consecutive grooves are staggered in position to prevent excessive weakening of the tube wall in this region.

The outer diameter of shank 10 is approximately 10mm, and the grooves 13 are approximately 25 mm in length, about 2mm in width, and above 1mm in depth.

In operation, when a bone biopsy specimen is being taken, the teeth 12 penetrate the bone by rotation of the shank 10, and bone dust formed by the action of the teeth 12 on the bone is permitted to escape from around the teeth by passage longitudinally along grooves 13, and at least some of the escaping dust may pass inwardly through apertures 14. The length of grooves 13 is selected to be slightly in excess of the core specimen so that the bone dust passing inwardly through apertures 14 is deposited on the outer end of the specimen when the latter is removed in the conventional way by a plunger passed downwardly through the shank to eject the specimen from the toothed end thereof.

By preventing bone dust from building up on the teeth, the drill can advance more easily through the bone with consequent reduction in discomfort to the patient, and the frequency at which the drill requires re-sharpening is similarly reduced.

Slices taken from biopsy specimens produced using a conventional drill and a drill made in accordance with the invention are illustrated respectively in Figures 3a and 3b. In Figure 3a there can be seen, at 20, a conglomeration of bone dust and damaged trabeculae. This is present at the edge of the specimen and also has penetrated to a considerable depth below the surface. At 21 there can be seen bone dust which has penetrated right into the centre of the specimen, whilst at 22 and 23 there can be seen respectively inner and outer zones of damaged cortex. It is extremely difficult with a biopsy specimen as illustrated in Figure 3a, for any degree of accuracy to be applied to the measurement of different tissue components within the specimen.

The biopsy slice illustrated in Figure 3b was produced using a drill modified to include grooves 13 in accordance with the invention. Here, it can be seen at 24 that the trabeculum is intact right to the outer edge of the slice, and there is no evidence of bone dust within or at the edges of the slice. Furthermore, both inner nd outer cortex regions are undamaged. it is evident that analytical measurements in a biopsy specimen taken with this drill are more easily obtained and with much greater accuracy.

CLAIMS

1. A bone drill comprising a tubular shank of circular cross-section having at one end a series of circumferentially-spaced, axially-extending saw teeth, and a groove between each successive pair of teeth extending part way along the outer surface of the shank to permit escape of bone dust from around

the cutting edges of the teeth.

2. A bone drill according to claim 1, in which each groove at the end remote from its associated tooth, tapers upwardly towards the outer surface of the tubular shank.

3. A bone drill according to claim 1 or claim 2, in which said grooves are parallel and extend longitudinally along the tubular shank.

4. A bone drill according to any one of claims 1 to 3, wherein, in each said groove, there is an aperture extending through the tube wall in the end region of the groove remote from the associated tooth.

5. A bone drill according to claim 4, wherein said apertures in consecutive grooves are staggered in position longitudinally to avoid excessive weakening of the tube wall.

6. A bone drill according to any preceding claim, in which the length of said grooves is approximately equal to two and half times the outer diameter of the tubular shank.

7. A bone drill according to any preceding claim, wherein the depth of each groove is approximately one tenth of the outer diameter of the tubular shank.

8. A bone drill according to any preceding claim, wherein the width of each groove is approximately one fifth of the outer diameter of the tubular shank.

9. A bone drill substantially as hereinbefore described, with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings.

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